EXHIBIT E

THE INVESTIGATOR'S GUIDE TO TIRE FAILURES

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Cover photo: Aftermath of a Tire Fire

Load, speed, inflation pressure and ambient temperature will all modify the failure rate. Note also that "soft" cords such as rayon will fray and fluff out more rapidly than, say, nylon, so the material of which the cords are made must figure in the assessment too.

The thickness of the casing of the tire modifies the position of the fracture. A thick bias ply truck tire will show impact damage deep inside the structure, and with further use the damage will progress outwards towards the tread until the failure point is reached. This effect puzzles many investigators but becomes more understandable if we liken the tire to a piece of wood supported at the ends. If a heavy blow is inflicted to its center, the wood splinters and breaks, but the damage begins not on the side immediately under the source of the impact but on the opposite side. This is because the wood bends and in doing so causes the fibers on the underside away from the blow to be stretched the furthest. In a somewhat similar way, the casing of a heavy tire will show the greatest damage not on the outermost ply (the ply closest to the tread pattern) but, as it turns out, on the next-to-innermost ply. The reason for the greatest damage not being on the innermost one is that this ply has in effect some freedom to dodge the blow, whereas the next-to-innermost ply is constrained on all sides.

Whatever the reason, the fact remains that the inner structure is weakened irreparably and the weakness progresses outwards with continued use. Eventually the tire fails and the tire displays the characteristic X fracture, which may then be obscured to some extent by the fluffing of the surrounding cord structure. The driver will almost certainly deny that the tire has ever been subjected to an impact. Probably he has forgotten all about it or perhaps he wasn't driving at the time, but impact fractures are easy to diagnose positively.

Radial tires are essentially of bias ply construction in the crown, as we learned in Chapter 2, in that they also have their belt cords laid diagonally. That being so, we can expect them to react in the same way to impacts in the crown area as bias ply tires, and they do.